Biophysical Chemistry – CH 4404 01
Assignment 10

Due Tuesday, December 3 (at the start of class)

Please complete the answers to this assignment on a separate page (or pages), showing your work and sources (if you referred elsewhere for constants, enthalpies, etc.).

1. An enzyme exhibiting Michaelis-Menton kinetics has a velocity of 0.333 v_{max} at a substrate concentration of 0.500 mM. What substrate concentration is required to double the velocity? (7 points)

2. Tinoco chapter 8, question #2, parts (a) and (b). (5 points)

3. For an enzyme that follows Michaelis-Menten kinetics, what concentration of substrate is needed (in terms of K_M) to obtain a steady-state velocity that is 95% of v_{max}? (Your answer should be a numeric factor multiplied by K_M.) For a typical experiment, do you think it will be possible to estimate v_{max} by eye from a plot of v_0 vs. [S]? (5 points)

4. Consider the competitive inhibition scheme discussed in class.

   a. Show that:

$$K'_M = K_M\left(1 + \frac{[I]}{K_I}\right)$$

   Where K_M is the standard Michaelis constant. (5 points)

   b. Does K_M change in the presence of an inhibitor? Justify your answer. (3 points)

5. Tinoco chapter 8, question #27. Don't forget to turn the page! (10 points)

6. Tinoco chapter 8, question #19. (15 points)